X - MICRO

# IEEE 802.11b

# WLAN 11b Broadband Router

User Manual

# IEEE 802.11b

# X-Micro WLAN 11b Broadband Router

# User's Manual

Version 1.2

## Trademarks



## Copyright Statement

# Terminology

| | |
|---|---|
| ANSI | American National Standards Institute |
| AP | Access Point |
| CCK | **C**omplementary **C**ode **K**eying |
| CSMA/CA | Carrier Sense Multiple Access/ Collision Avoidance |
| CSMA/CD | Carrier Sense Multiple Access/ Collision Detection |
| DHCP | Dynamic Host Configuration Protocol |
| DSSS | Direct Sequence Spread Spectrum |
| FCC | Federal Communications Commission |
| FTP | File Transfer Protocol |
| IEEE | Institute of Electrical and Electronic Engineers |
| IP | Internet Protocol |
| ISM | Industrial, Scientific and Medical |
| LAN | Local Area Network |
| MAC | Media Access Control |
| NAT | Network Address Translation |
| NT | Network Termination |
| PSD | Power Spectral Density |
| RF | Radio Frequency |
| SNR | Signal to Noise Ratio |
| SSID | Service Set Identification |
| TCP | Transmission Control Protocol |
| TFTP | Trivial File Transfer Protocol |
| WEP | Wired Equivalent Privacy |
| WLAN | Wireless Local Area Network |

# Table of Contents

# 1 Introduction

The X-Micro WLAN 11b Broadband Router is an affordable IEEE 802.11b wireless LAN broadband router solution, setting SOHO and enterprise standard for high performance, secure, manageable and reliable WLAN.

This document describes the steps required for the initial IP address assign and other WLAN router configuration. The description includes the implementation of the above steps.

**Notice: It will take about 25 seconds to complete the boot up sequence after powered on the X-Micro WLAN 11b Broadband Router; all LEDs are blank while booting except the Power LED, and after that the WLAN Activity LED will be flashing to show the WLAN interface is enabled and working now.**

## 1.1 Package contents

The package of the X-Micro WLAN 11b Broadband Router includes the following items,

- ✓ The X-Micro WLAN 11b Broadband Router
- ✓ The AC to DC 9V Power Adapter
- ✓ User's manual CD-ROM

## 1.2 Product Specifications

| | |
|---|---|
| Product Name | X-Micro WLAN 11b Broadband Router |
| Standard | 801.11b(Wireless), 802.3(10BaseT), 802.3u(100BaseT) |
| Data Transfer Rate | 11Mbps(Wireless), 100Mbps(Ethernet) |
| Modulation Method | DBPSK/ DQPSK/ CCK |
| Frequency Band | 2.4GHz – 2.497GJz ISM Band, DSSS |
| RF Output Power | < 17 dBm |
| Receiver Sensitivity | 11Mbps better than 8% PER @ -88 dBm |
| Operation Range | 30 to 300 meters (depend on surrounding) |
| Antenna | External Antenna |
| LED | Power, Active (WLAN), Act/Link (Ethernet) |
| Security | 64 bit/ 128 bit WEP, port filtering, IP filtering, MAC filtering, port forwarding and DMZ hosting |
| LAN interface | One 10/100BaseT with RJ45 connector (WAN)<br>Four 10/100BaseT with RJ45 connectors (LAN) |
| Power Consumption | DC 9V Power Adapter |

| | |
|---|---|
| Dimension | 160 x 110 x 35 mm |
| Operating Temperature | 0 – 50$^{o}$C ambient temperature |
| Storage Temperature | -20 - 70$^{o}$C ambient temperature |
| Humidity | 5 to 90 % maximum (non-condensing) |

## 1.3 Product Features

- Complies with IEEE 802.11b standard for 2.4GHz Wireless LAN.
- Supports 11Mbps data transfer rate with automatic fallback to 5.5M, 2M and 1Mbps.
- Supports bridging, routing functions between wireless and wired Ethernet interfaces.
- Supports 64-bit and 128-bit WEP encryption/decryption function to protect the wireless data transmission.
- Supports IEEE 802.3x full duplex flow control on 10/100M Ethernet interface.
- Supports DHCP server to provide clients auto IP addresses assignment.
- Supports DHCP client for Ethernet WAN interface auto IP address assignment.
- Supports static and dynamic IP routing.
- Supports PPPoE on Ethernet WAN interface.
- Supports clone MAC address function.
- Supports firewall security with port filtering, IP filtering, MAC filtering, port forwarding, trigger port and DMZ hosting functions.
- Supports WEB based management and configuration.

## 1.4 Front Panel Description

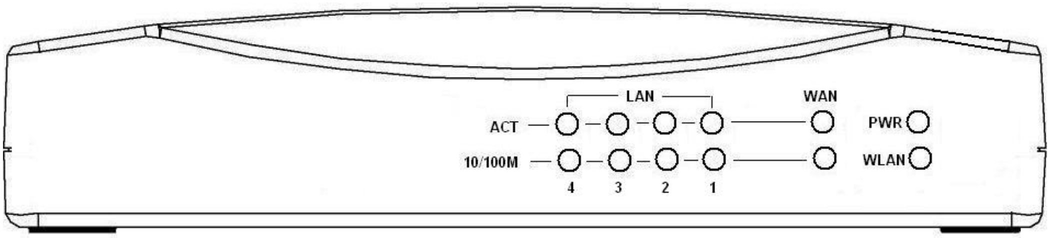



Figure 1 – X-Micro WLAN 11b Broadband Router Front Panel

| LED Indicator | State | Description |
|---|---|---|
| 1. Power LED | On | The WLAN 11b Broadband Router is powered on. |
| | Off | The WLAN 11b Broadband Router is powered off. |

| | | |
|---|---|---|
| 2. WLAN Activity LED | Flashing | Data is transmitting or receiving on the antenna. |
| | Off | No data is transmitting or receiving on the antenna. |
| 3. WAN ACT LED | Flashing | Data is transmitting or receiving on the WAN interface. |
| | Off | No data is transmitting or receiving on the WAN interface. |
| 4. WAN 10/100M LED | On | Connection speed is 100Mbps on WAN interface. |
| | Off | Connection speed is 10Mbps on WAN interface. |
| 5. LAN ACT LED | Flashing | Data is transmitting or receiving on the LAN interface. |
| | Off | No data is transmitting or receiving on the LAN interface. |
| 6. LAN 10/100M LED | On | Connection speed is 100Mbps on LAN interface. |
| | Off | Connection speed is 10Mbps on LAN interface. |

## 1.5 Rear Panel Description

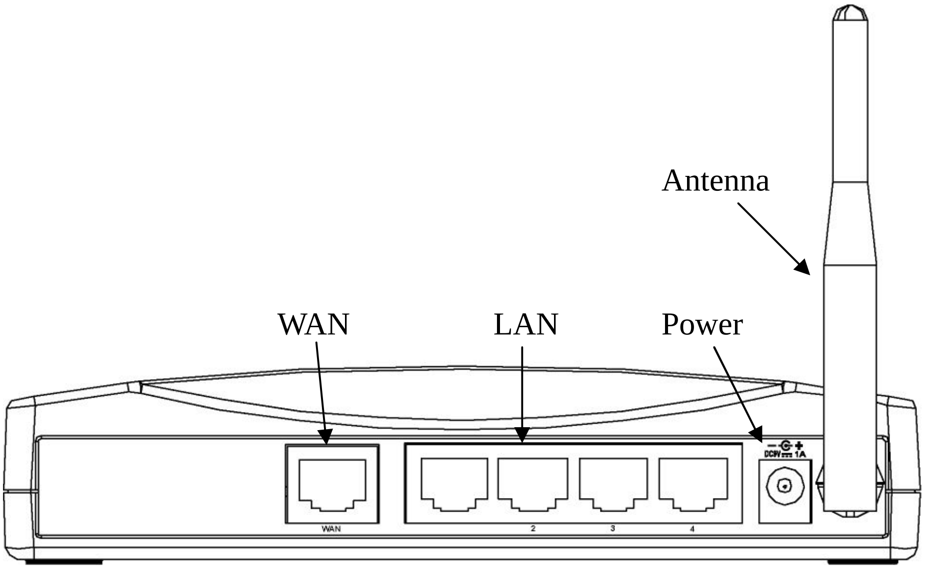



Figure 2 – X-Micro WLAN 11b Broadband Router Rear Panel

| Interfaces | Description |
|---|---|
| 1. WAN | The RJ-45 socket allows WAN connection through a Category 5 cable. Support auto-sensing on 10/100M speed and half/ full duplex; comply with IEEE 802.3/ 802.3u respectively. |
| 2. LAN | The RJ-45 sockets allow LAN connection through Category 5 cables. Support auto-sensing on 10/100M speed and half/ full duplex; comply with IEEE 802.3/ 802.3u respectively. |

| | |
|---|---|
| 3. Power | The power jack allows an external DC +9 V power supply connection. The external AC to DC adaptor provide adaptive power requirement to the X-Micro WLAN 11b Broadband Router. |
| 4. Antenna | The Wireless LAN Antenna. |

# 2 Installation

## 2.1 Hardware Installation

Step One: Place the X-Micro WLAN 11b Broadband Router to the best optimum transmission location.

The best transmission location for your X-Micro WLAN 11b Broadband Router is usually at the geographic center of your wireless network, with line of sign to all of your mobile stations.

Step Two: Connect the X-Micro WLAN 11b Broadband Router to your wired network.

Connect the Ethernet WAN interface of X-Micro WLAN 11b Broadband Router by category 5 Ethernet cable to your switch/ hub/ xDSL modem or cable modem. A straight-through Ethernet cable with appropriate cable length is needed.

Step Three: Supply DC power to the X-Micro WLAN 11b Broadband Router.

Use only the AC/DC power adapter supplied with the X-Micro WLAN 11b Broadband Router; it may occur damage by using a different type of power adapter.

The hardware installation finished.

## 2.2 Software Installation

- There are no software drivers, patches or utilities installation needed, but only the configuration setting. Please refer to chapter 3 for software configuration.

# 3 Software configuration

There are web based management and configuration functions allowing you to have the jobs done easily.

The X-Micro WLAN 11b Broadband Router is delivered with the following factory default parameters on the Ethernet LAN interfaces.

Default IP Address**:** ***192.168.1.254***
Default IP subnet mask**:** ***255.255.255.0***
WEB login User Name**:** ***<empty>***
WEB login Password**:** ***<empty>***

## 3.1 Prepare your PC to configure the X-Micro WLAN 11b Broadband Router

**For OS of Microsoft Windows 95/ 98/ Me:**

1. Click the ***Start*** button and select ***Settings***, then click ***Control Panel***. The ***Control Panel*** window will appear.
   **Note:** Windows Me users may not see the Network control panel. If so, *select* **View all Control Panel options** on the left side of the window
2. Move mouse and double-click the right button on ***Network*** icon. The ***Network*** window will appear.
3. Check the installed list of ***Network Components***. If TCP/IP is not installed, click the ***Add*** button to install it; otherwise go to step 6.
4. Select ***Protocol*** in the ***Network Component Type*** dialog box and click ***Add*** button.
5. Select ***TCP/IP*** in ***Microsoft*** of ***Select Network Protocol*** dialog box then click OK button to install the TCP/IP protocol, it may need the Microsoft Windows CD to complete the installation. Close and go back to ***Network*** dialog box after the TCP/IP installation.
6. Select ***TCP/IP*** and click the ***properties*** button on the ***Network*** dialog box.
7. Select ***Specify an IP address*** and type in values as following example.
   - ✓ IP Address: **192.168.1.1**, any IP address within 192.168.1.1 to 192.168.1.253 is good to connect the Wireless LAN Access Point.
   - ✓ IP Subnet Mask: **255.255.255.0**
8. Click OK and reboot your PC after completes the IP parameters setting.

**For OS of Microsoft Windows 2000, XP:**

1. Click the ***Start*** button and select ***Settings***, then click ***Control Panel***. The ***Control Panel*** window will appear.

2. Move mouse and double-click the right button on ***Network and Dial-up Connections*** icon. Move mouse and double-click the ***Local Area Connection*** icon. The ***Local Area Connection*** window will appear. Click ***Properties*** button in the ***Local Area Connection*** window.
3. Check the installed list of ***Network Components***. If TCP/IP is not installed, click the ***Add*** button to install it; otherwise go to step 6.
4. Select ***Protocol*** in the ***Network Component Type*** dialog box and click ***Add*** button.
5. Select ***TCP/IP*** in ***Microsoft*** of ***Select Network Protocol*** dialog box then click OK button to install the TCP/IP protocol, it may need the Microsoft Windows CD to complete the installation. Close and go back to ***Network*** dialog box after the TCP/IP installation.
6. Select ***TCP/IP*** and click the ***properties*** button on the ***Network*** dialog box.
7. Select ***Specify an IP address*** and type in values as following example.
   - ✓ IP Address: **192.168.1.1**, any IP address within 192.168.1.1 to 192.168.1.253 is good to connect the Wireless LAN Access Point.
   - ✓ IP Subnet Mask: **255.255.255.0**
8. Click OK to completes the IP parameters setting.

### For OS of Microsoft Windows NT:

1. Click the ***Start*** button and select ***Settings***, then click ***Control Panel***. The ***Control Panel*** window will appear.
2. Move mouse and double-click the right button on ***Network*** icon. The ***Network*** window will appear. Click ***Protocol*** tab from the ***Network*** window.
3. Check the installed list of ***Network Protocol*** window. If TCP/IP is not installed, click the ***Add*** button to install it; otherwise go to step 6.
4. Select ***Protocol*** in the ***Network Component Type*** dialog box and click ***Add*** button.
5. Select ***TCP/IP*** in ***Microsoft*** of ***Select Network Protocol*** dialog box then click OK button to install the TCP/IP protocol, it may need the Microsoft Windows CD to complete the installation. Close and go back to ***Network*** dialog box after the TCP/IP installation.
6. Select ***TCP/IP*** and click the ***properties*** button on the ***Network*** dialog box.
7. Select ***Specify an IP address*** and type in values as following example.
   - ✓ IP Address: **192.168.1.1**, any IP address within 192.168.1.1 to 192.168.1.253 is good to connect the Wireless LAN Access Point.
   - ✓ IP Subnet Mask: **255.255.255.0**
8. Click OK to completes the IP parameters setting.

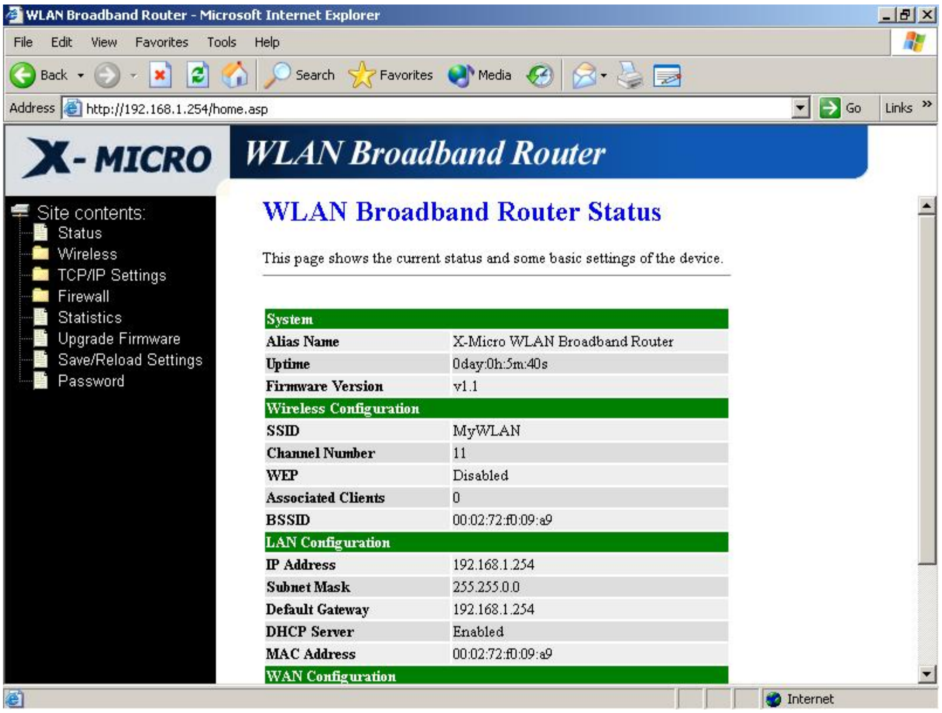
## 3.2 Connect to the X-Micro WLAN 11b Broadband Router

Open a WEB browser, i.e. Microsoft Internet Explore, then enter 192.168.1.254 on the URL to connect the X-Micro WLAN 11b Broadband Router.

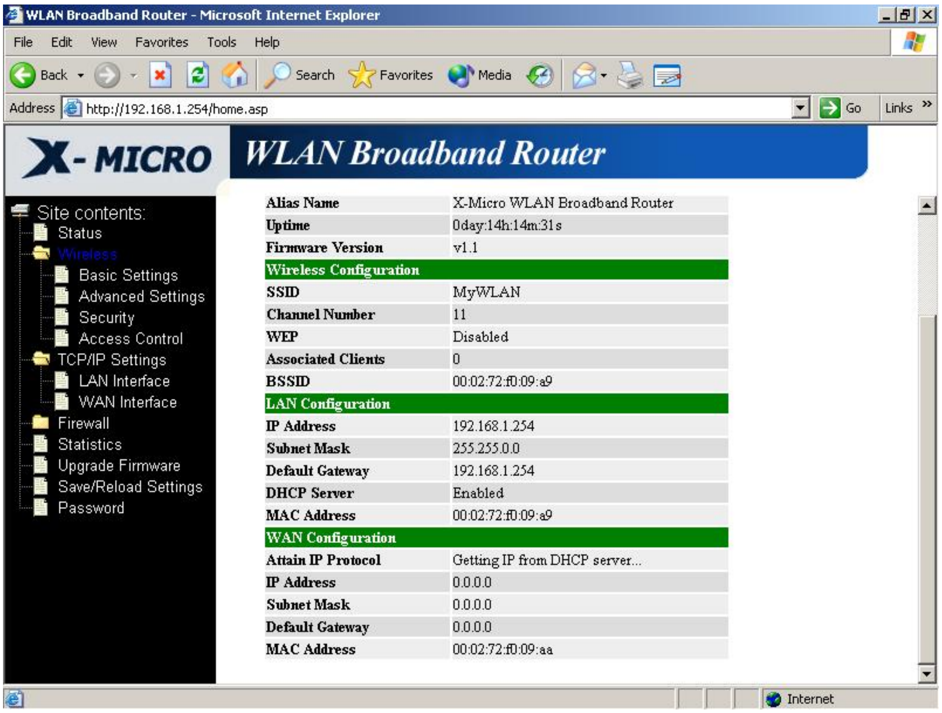
## 3.3 Management and configuration on the X-Micro WLAN 11b Broadband Router

### 3.3.1 Status

This page shows the current status and some basic settings of the device, includes system, wireless, Ethernet LAN and WAN configuration information.




<u>Screenshot – Status-1</u>



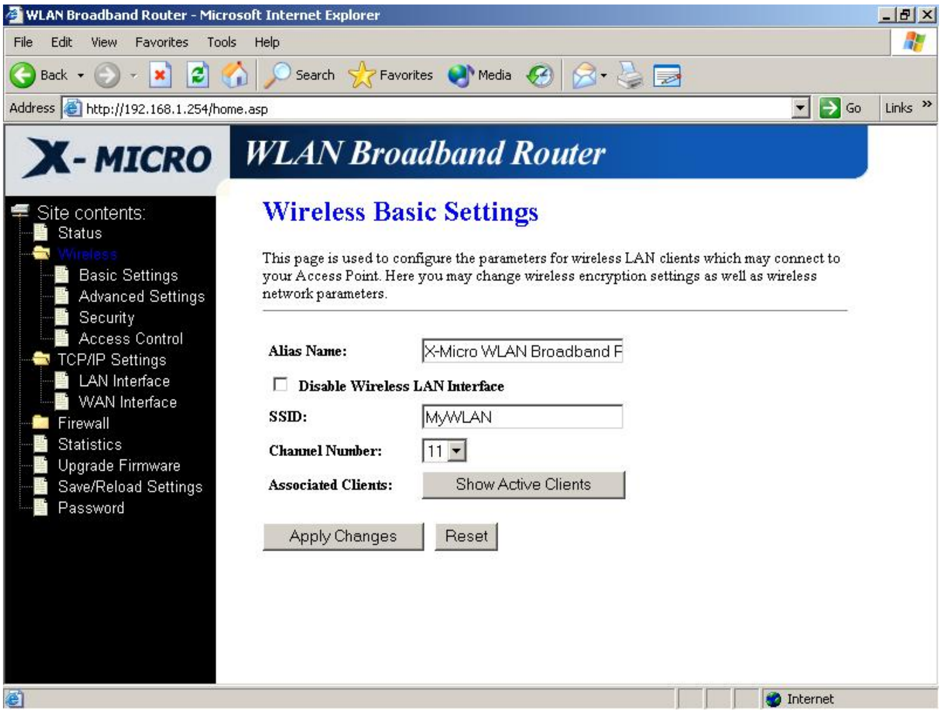

Screenshot – Status-2

| Item | Description |
|---|---|
| ***System*** | |
| ***Alias Name*** | It shows the alias name of this X-Micro WLAN 11b Broadband Router. |
| ***Uptime*** | It shows the duration since X-Micro WLAN 11b Broadband Router is powered on. |
| ***Firmware version*** | It shows the firmware version of X-Micro WLAN 11b Broadband Router. |
| ***Wireless configuration*** | |
| ***SSID*** | It shows the SSID of this X-Micro WLAN 11b Broadband Router.<br>The SSID is the unique name of X-Micro WLAN 11b Broadband Router and shared among its service area, so all devices attempts to join the same wireless network can identify it. |
| ***Channel Number*** | It shows the wireless channel connected currently. |
| ***WEP*** | It shows the status of WEP encryption function. |
| ***Associated Clients*** | It shows the number of connected clients (or stations, |

| | |
|---|---|
| | PCs). |
| ***BSSID*** | It shows the BSSID address of the X-Micro WLAN 11b Broadband Router. BSSID is a six-byte address. |
| ***LAN configuration*** | |
| ***IP Address*** | It shows the IP address of LAN interfaces of X-Micro WLAN 11b Broadband Router. |
| ***Subnet Mask*** | It shows the IP subnet mask of LAN interfaces of X-Micro WLAN 11b Broadband Router. |
| ***Default Gateway*** | It shows the default gateway setting for LAN interfaces outgoing data packets. |
| ***DHCP Server*** | It shows the DHCP server is enabled or not. |
| ***MAC Address*** | It shows the MAC address of LAN interfaces of X-Micro WLAN 11b Broadband Router. |
| ***WAN configuration*** | |
| ***Attain IP Protocol*** | It shows how the X-Micro WLAN 11b Broadband Router gets the IP address. The IP address can be set manually to a fixed one or set dynamically by DHCP server or attain IP by PPPoE connection. |
| ***IP Address*** | It shows the IP address of WAN interface of X-Micro WLAN 11b Broadband Router. |
| ***Subnet Mask*** | It shows the IP subnet mask of WAN interface of X-Micro WLAN 11b Broadband Router. |
| ***Default Gateway*** | It shows the default gateway setting for WAN interface outgoing data packets. |
| ***MAC Address*** | It shows the MAC address of WAN interface of X-Micro WLAN 11b Broadband Router. |

### 3.3.2 Wireless Basic Settings

This page is used to configure the parameters for wireless LAN clients that may connect to your Broadband Router. Here you may change wireless encryption settings as well as wireless network parameters.

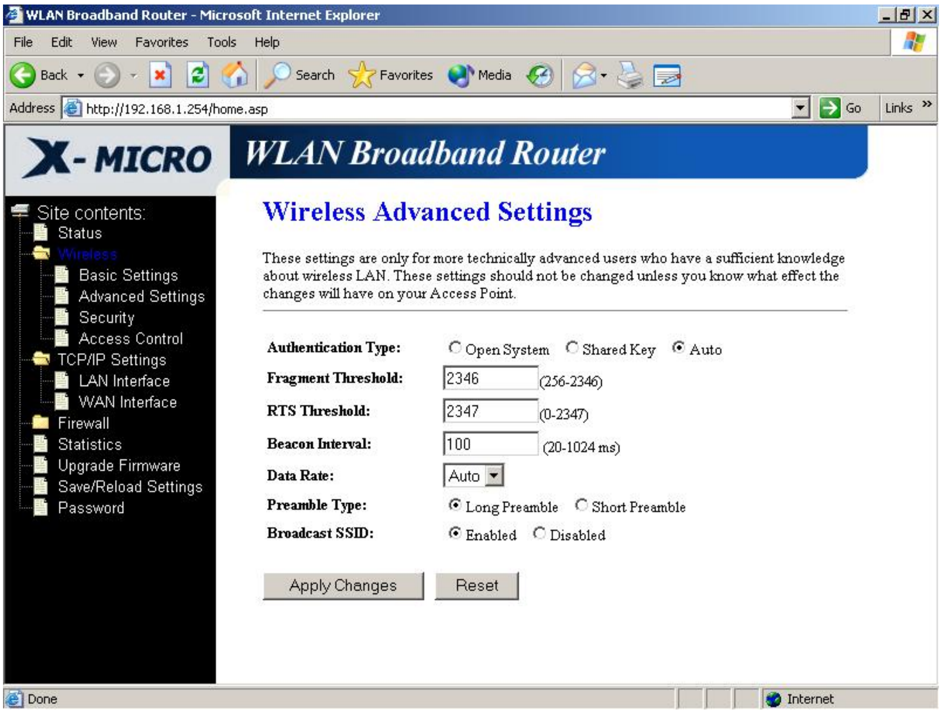



Screenshot – Wireless Basic Settings

| Item | Description |
|---|---|
| ***Alias Name*** | It is the alias name of this X-Micro WLAN 11b Broadband Router. The alias name can be 32 characters long. |
| ***Disable Wireless LAN Interface*** | Tick on to disable the wireless LAN data transmission. |
| ***SSID*** | It is the wireless network name. The SSID can be 32 bytes long. |
| ***Channel Number*** | Select the wireless communication channel from pull-down menu. |
| ***Associated Clients*** | Click the ***Show Active Clients*** button to open Active Wireless Client Table that shows the MAC address, transmit-packet, receive-packet and transmission-rate for each associated wireless client. |
| ***Apply Changes*** | Click the ***Apply Changes*** button to complete the new configuration setting. |
| ***Reset*** | Click the ***Reset*** button to abort change and recover the previous configuration setting. |

### 3.3.3 Wireless Advanced Settings

These settings are only for more technically advanced users who have a sufficient knowledge about wireless LAN. These settings should not be changed unless you know what effect the changes will have on your X-Micro WLAN 11b Broadband Router.



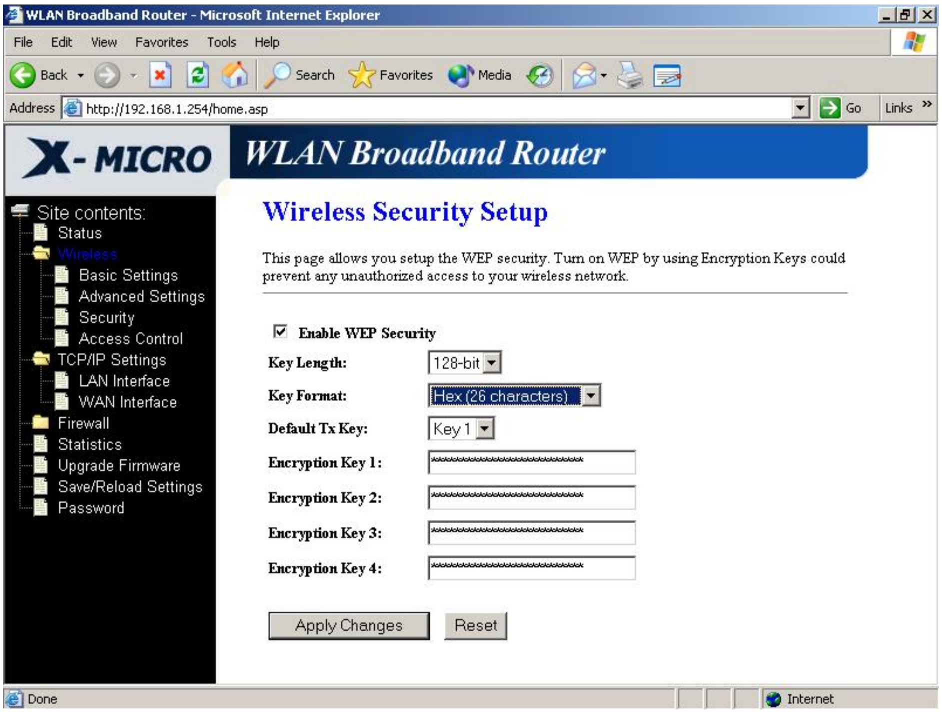

Screenshot – Wireless Advanced Settings

| Item | Description |
|---|---|
| ***Authentication Type*** | Click to select the authentication type in ***Open System***, ***Shared Key*** or ***Auto selection***. |
| ***Fragment Threshold*** | Set the data packet fragmentation threshold, value can be written between 256 and 2346 bytes. Refer to 4.10 What is Fragment Threshold? |
| ***RTS Threshold*** | Set the RTS Threshold, value can be written between 0 and 2347 bytes. Refer to 4.11 What is RTS (Request To Send) Threshold? |
| ***Beacon Interval*** | Set the Beacon Interval, value can be written between 20 and 1024 ms.<br>Refer to 4.12 What is Beacon Interval? |
| ***Data Rate*** | Select the transmission data rate from pull-down menu. Data rate can be auto-select, 11M, 5.5M, 2M or 1Mbps. |

| | |
|---|---|
| ***Preamble Type*** | Click to select the ***Long Preamble*** or ***Short Preamble*** support on the wireless data packet transmission. Refer to 4.13 What is Preamble Type? |
| ***Broadcast SSID*** | Click to enable or disable the SSID broadcast function. Refer to 4.14 What is SSID Broadcast? |
| ***Apply Changes*** | Click the ***Apply Changes*** button to complete the new configuration setting. |
| ***Reset*** | Click the ***Reset*** button to abort change and recover the previous configuration setting. |

## 3.3.4 Wireless Security Setup

This page allows you setup the WEP security. Turn on WEP by using encryption keys could prevent any unauthorized access to your wireless network.




Screenshot – Wireless Security Setup

| **Item** | **Description** |
|---|---|
| ***Enable WEP Security*** | Click the check box to enable WEP security function. Refer to 4.9 What is WEP? |
| ***Key Length*** | Select the WEP shared secret key length from pull-down menu. The length can be chose between 64-bit and |

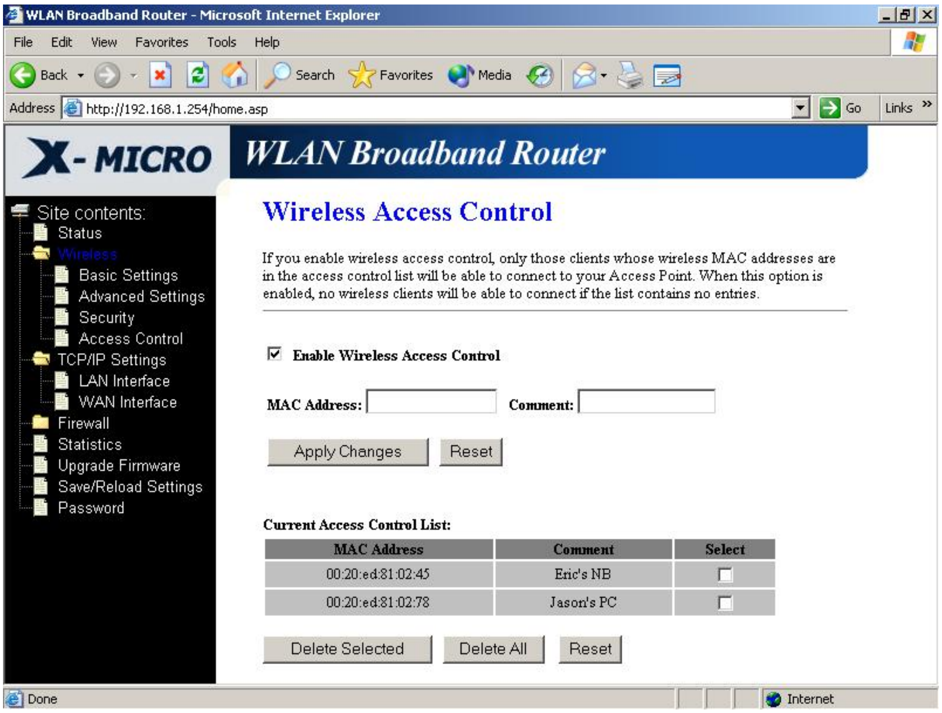
| | |
|---|---|
| | 128-bit (known as "WEP2") keys.<br>The WEP key is composed of initialization vector (24 bits) and secret key (40-bit or 104-bit). |
| ***Key Format*** | Select the WEP shared secret key format from pull-down menu. The format can be chose between plant text (ASCII) and hexadecimal (HEX) code. |
| ***Default Tx Key*** | Set the default secret key for WEP security function. Value can be chose between 1 and 4. |
| ***Encryption Key 1*** | Secret key 1 of WEP security encryption function. |
| ***Encryption Key 2*** | Secret key 2 of WEP security encryption function. |
| ***Encryption Key 3*** | Secret key 3 of WEP security encryption function. |
| ***Encryption Key 4*** | Secret key 4 of WEP security encryption function. |
| ***Apply Changes*** | Click the ***Apply Changes*** button to complete the new configuration setting. |
| ***Reset*** | Click the ***Reset*** button to abort change and recover the previous configuration setting. |

WEP encryption key (secret key) length:

| Length / Format | 64-bit | 128-bit |
|---|---|---|
| ASCII | 5 characters | 13 characters |
| HEX | 10 hexadecimal codes | 26 hexadecimal codes |

### 3.3.5 Wireless Access Control

If you enable wireless access control, only those clients whose wireless MAC addresses are in the access control list will be able to connect to your Access Point. When this option is enabled, no wireless clients will be able to connect if the list contains no entries.



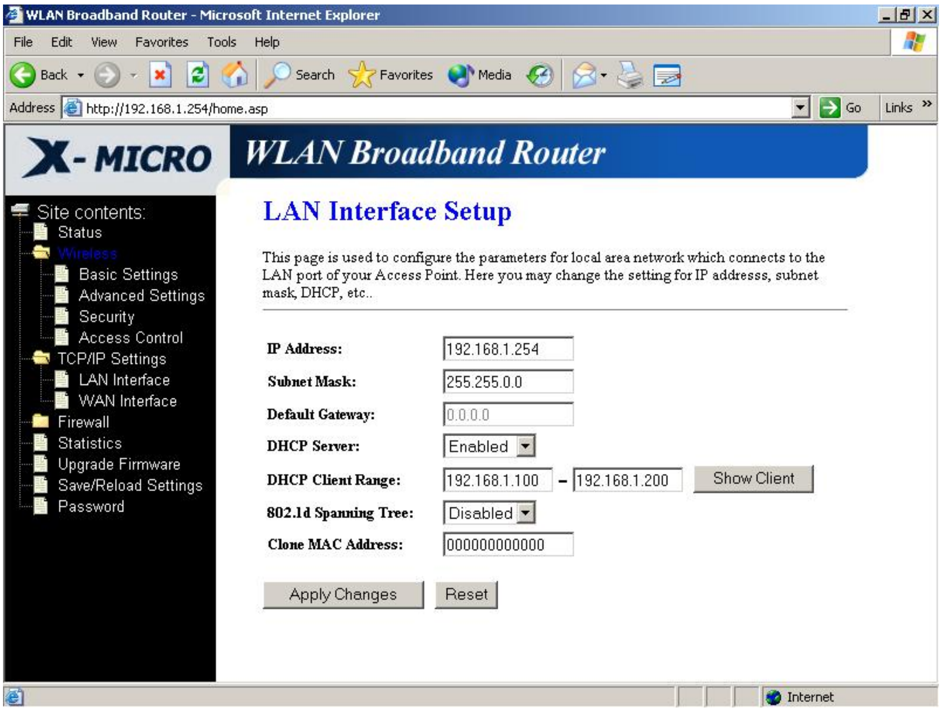

<u>Screenshot – Wireless Access Control</u>

| Item | Description |
|---|---|
| ***Enable WEP Security*** | Click the check box to enable wireless access control. This is a security control function; only those clients registered in the access control list can link to this X-Micro WLAN 11b Broadband Router. |
| ***MAC Address*** | Fill in the MAC address of client to register this X-Micro WLAN 11b Broadband Router access capability. |
| ***Comment*** | Fill in the comments for the registered client. |
| ***Apply Changes*** | Click the ***Apply Changes*** button to register the client to new configuration setting. |
| ***Reset*** | Click the ***Reset*** button to abort change and recover the previous configuration setting. |
| ***Current Access Control List*** | It shows the registered clients that are allowed to link to this X-Micro 11b WLAN Broadband Router. |
| ***Delete Selected*** | Click to delete the selected clients that will be access right removed from this X-Micro WLAN 11b Broadband Router. |
| ***Delete All*** | Click to delete all the registered clients from the access allowed list. |

| | |
|---|---|
| ***Reset*** | Click the ***Reset*** button to abort change and recover the previous configuration setting. |

## 3.3.6 LAN Interface Setup

This page is used to configure the parameters for local area network that connects to the LAN ports of your X-Micro WLAN 11b Broadband Router. Here you may change the setting for IP address, subnet mask, DHCP, etc.



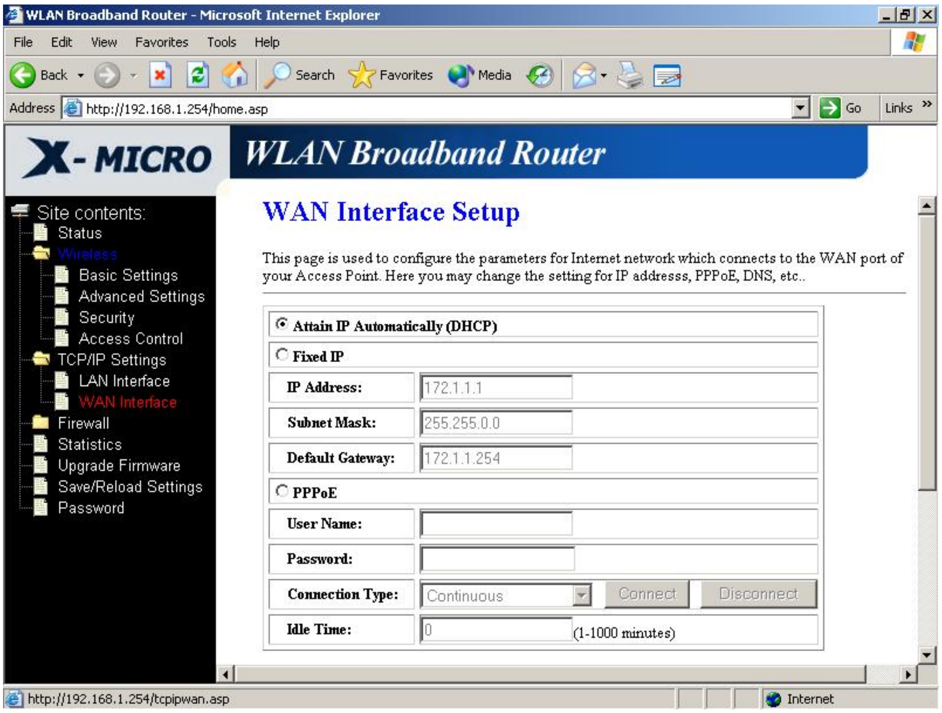

Screenshot – LAN Interface Setup

| Item | Description |
|---|---|
| ***IP Address*** | Fill in the IP address of LAN interfaces of this X-Micro WLAN 11b Broadband Router. |
| ***Subnet Mask*** | Fill in the subnet mask of LAN interfaces of this X-Micro WLAN 11b Broadband Router. |
| ***Default Gateway*** | Fill in the default gateway for LAN interfaces out going data packets. |
| ***DHCP Server*** | Select to enable or disable the DHCP server function on LAN interfaces from pull-down menu. |
| ***DHCP Client Range*** | Fill in the start IP address and end IP address to allocate a range of IP addresses; client with DHCP function set will |

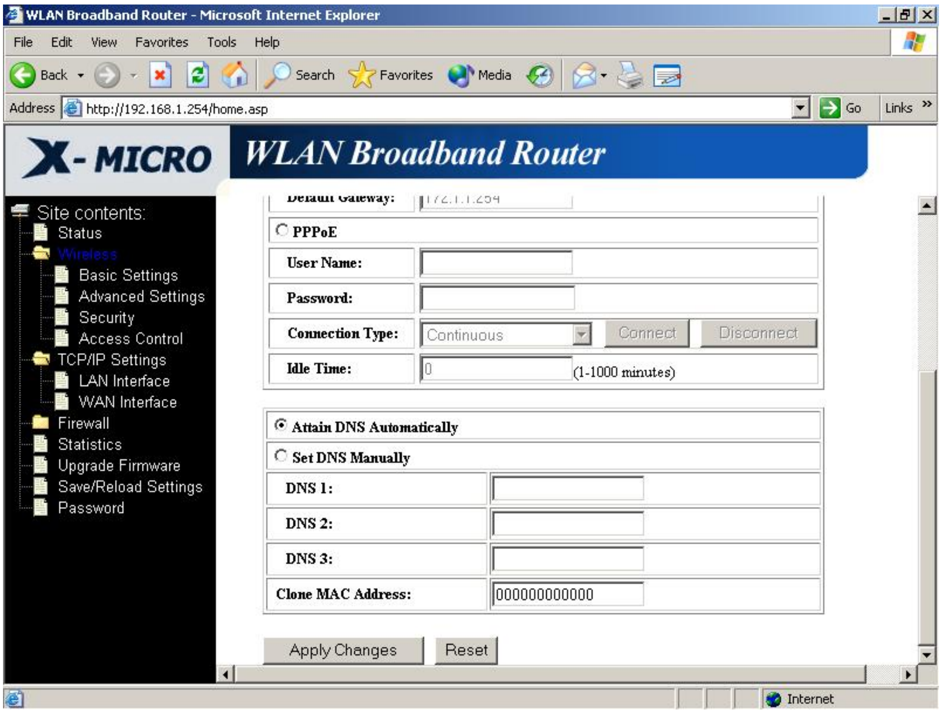
| | |
|---|---|
| | be assign a IP address from the range. |
| ***Show Client*** | Click to open the ***Active DHCP Client Table*** window that shows the active clients with their assigned IP address, MAC address and time expired information. |
| ***802.1d Spanning Tree*** | Select to enable or disable the IEEE 802.1d Spanning Tree function from pull-down menu. |
| ***Clone MAC Address*** | Fill in the MAC address that is the MAC address to be cloned.<br>Clone MAC address is designed for your special application that request the clients to register to a server machine with one identified MAC address.<br>Since that all the clients will communicate outside world through the X-Micro WLAN 11b Broadband Router, so have the cloned MAC address set on the X-Micro WLAN 11b Broadband Router will solve the issue. |
| ***Apply Changes*** | Click the ***Apply Changes*** button to complete the new configuration setting. |
| ***Reset*** | Click the ***Reset*** button to abort change and recover the previous configuration setting. |

### 3.3.7 WAN Interface Setup

This page is used to configure the parameters for wide area network that connects to the WAN port of your X-Micro WLAN 11b Broadband Router. Here you may change the setting for IP address, PPPoE and DNS, etc.




Screenshot – WAN Interface Setup - 1




Screenshot – WAN Interface Setup - 2

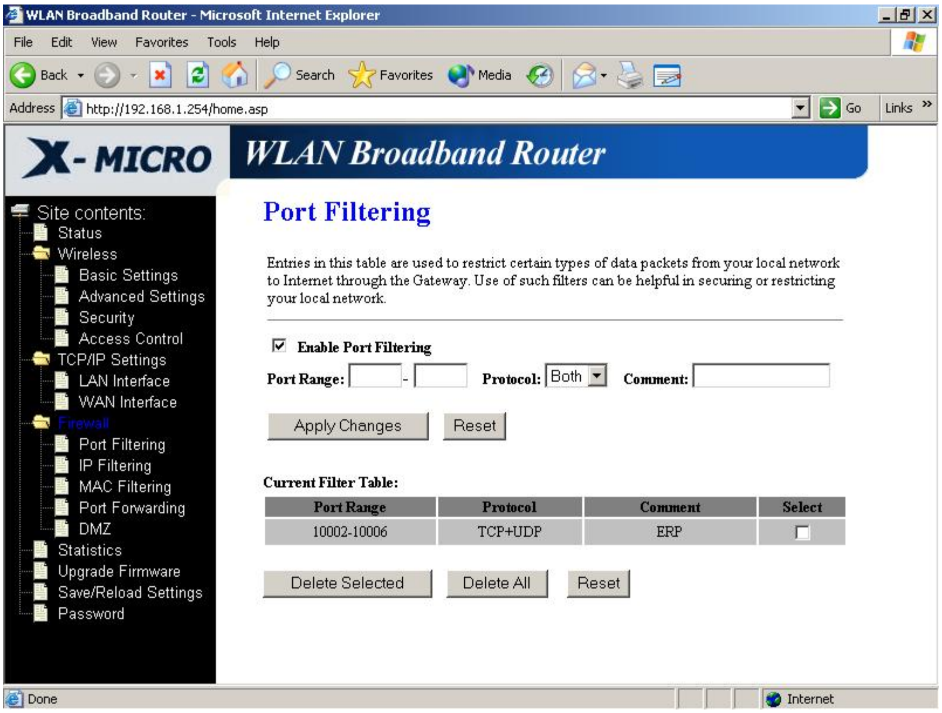
| Item | Description |
|---|---|
| ***Attain IP Automatically*** | Click to select DHCP support on WAN interface for IP address assigned automatically from a DHCP server. |

| | |
|---|---|
| ***(DHCP)*** | |
| ***Fixed IP*** | Click to select fixed IP support on WAN interface. There are IP address, subnet mask and default gateway settings need to be done. |
| ***IP Address*** | If you select the fixed IP support on WAN interface, fill in the IP address for it. |
| ***Subnet Mask*** | If you select the fixed IP support on WAN interface, fill in the subnet mask for it. |
| ***Default Gateway*** | If you select the fixed IP support on WAN interface, fill in the default gateway for WAN interface out going data packets. |
| ***PPPoE*** | Click to select PPPoE support on WAN interface. There are user name, password, connection type and idle time settings need to be done. |
| ***User Name*** | If you select the PPPoE support on WAN interface, fill in the user name and password to login the PPPoE server. |
| ***Password*** | If you select the PPPoE support on WAN interface, fill in the user name and password to login the PPPoE server. |
| ***Connection Type*** | Select the connection type from pull-down menu. There are ***Continuous***, ***Connect on Demand*** and ***Manual*** three types to select.<br>***Continuous*** connection type means to setup the connection through PPPoE protocol whenever this X-Micro WLAN 11b Broadband Router is powered on.<br>***Connect on Demand*** connection type means to setup the connection through PPPoE protocol whenever you send the data packets out through the WAN interface; there are a watchdog implemented to close the PPPoE connection while there are no data sent out longer than the idle time set.<br>***Manual*** connection type means to setup the connection through the PPPoE protocol by clicking the ***Connect*** button manually, and clicking the ***Disconnect*** button manually. |
| ***Idle Time*** | If you select the ***PPPoE*** and ***Connect on Demand*** connection type, fill in the idle time for auto-disconnect function. Value can be between 1 and 1000 minutes. |

| | |
|---|---|
| ***Attain DNS Automatically*** | Click to select getting DNS address for ***DHCP***, ***PPPoE*** support. Please select ***Set DNS Manually*** if the ***Fixed IP*** support is selected. |
| ***Set DNS Manually*** | Click to select getting DNS address for ***Fixed IP*** support. |
| ***DNS 1*** | Fill in the IP address of Domain Name Server 1. |
| ***DNS 2*** | Fill in the IP address of Domain Name Server 2. |
| ***DNS 3*** | Fill in the IP address of Domain Name Server 3. |
| ***Apply Changes*** | Click the ***Apply Changes*** button to complete the new configuration setting. |
| ***Reset*** | Click the ***Reset*** button to abort change and recover the previous configuration setting. |

### 3.3.8 Firewall - Port Filtering

Entries in this table are used to restrict certain types of data packets from your local network to Internet through the Gateway. Use of such filters can be helpful in securing or restricting your local network.



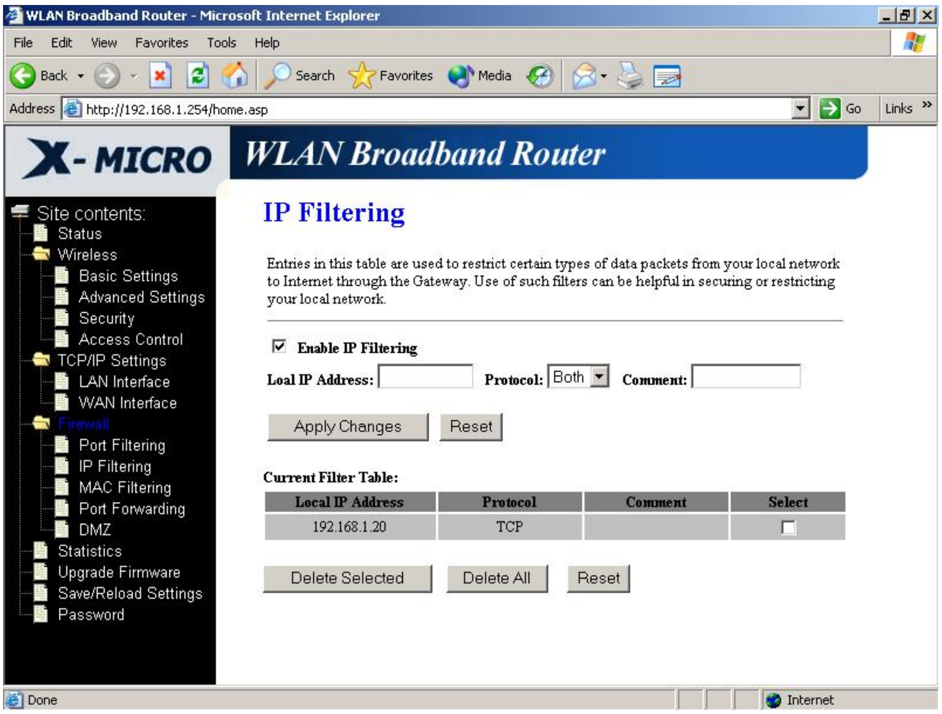

Screenshot – Firewall - Port Filtering

| Item | Description |
|---|---|
| ***Enable Port Filtering*** | Click to enable the port filtering security function. |

| | |
|---|---|
| ***Port Range*** <br> ***Protocol*** <br> ***Comments*** | To restrict data transmission from the local network on certain ports, fill in the range of start-port and end-port, and the protocol, also put your comments on it. <br> The ***Protocol*** can be TCP, UDP or Both. <br> ***Comments*** let you know about whys to restrict data from the ports. |
| ***Apply Changes*** | Click the ***Apply Changes*** button to register the ports to port filtering list. |
| ***Reset*** | Click the ***Reset*** button to abort change and recover the previous configuration setting. |
| ***Delete Selected*** | Click to delete the selected port range that will be removed from the port-filtering list. |
| ***Delete All*** | Click to delete all the registered entries from the port-filtering list. |
| ***Reset*** | Click the ***Reset*** button to abort change and recover the previous configuration setting. |

### 3.3.9 Firewall - IP Filtering

Entries in this table are used to restrict certain types of data packets from your local network to Internet through the Gateway. Use of such filters can be helpful in securing or restricting your local network.

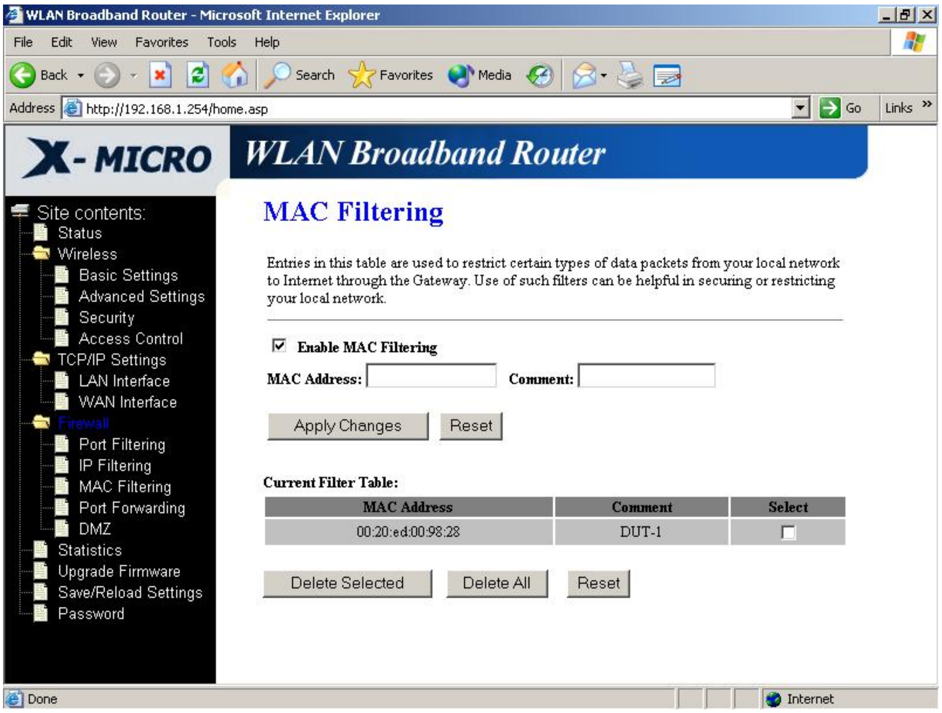


Screenshot – Firewall - IP Filtering

| Item | Description |
|---|---|
| ***Enable IP Filtering*** | Click to enable the IP filtering security function. |
| ***Local IP Address***<br>***Protocol***<br>***Comments*** | To restrict data transmission from local network on certain IP addresses, fill in the IP address and the protocol, also put your comments on it.<br>The ***Protocol*** can be TCP, UDP or Both.<br>***Comments*** let you know about whys to restrict data from the IP address. |
| ***Apply Changes*** | Click the ***Apply Changes*** button to register the IP address to IP filtering list. |
| ***Reset*** | Click the ***Reset*** button to abort change and recover the previous configuration setting. |
| ***Delete Selected*** | Click to delete the selected IP address that will be removed from the IP-filtering list. |
| ***Delete All*** | Click to delete all the registered entries from the IP-filtering list. |
| ***Reset*** | Click the ***Reset*** button to abort change and recover the previous configuration setting. |

### 3.3.10 Firewall - MAC Filtering

Entries in this table are used to restrict certain types of data packets from your local network to Internet through the Gateway. Use of such filters can be helpful in securing or restricting your local network.



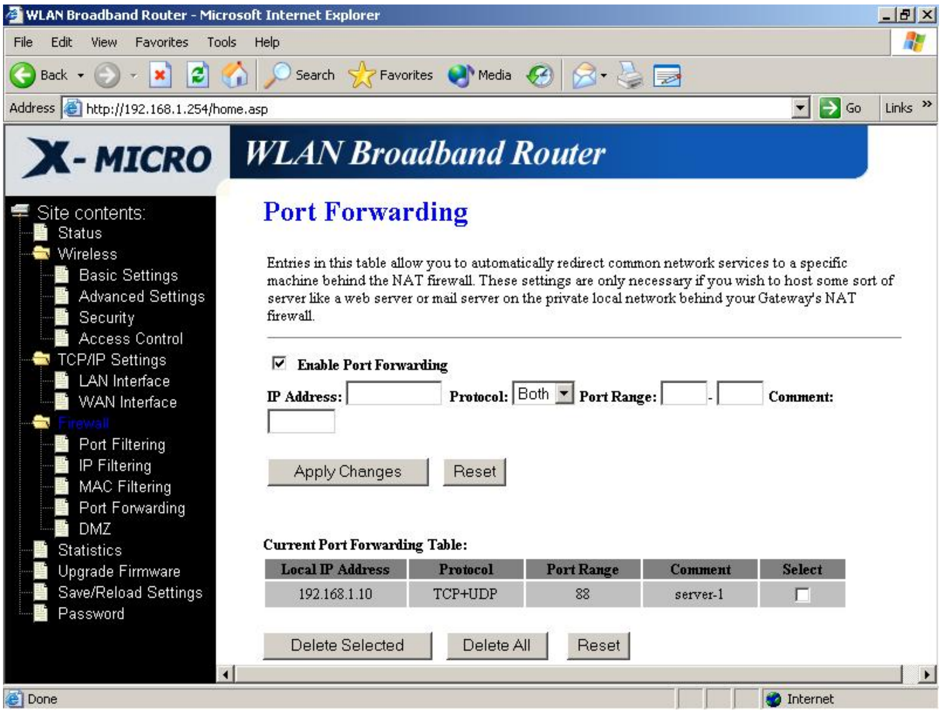

Screenshot – Firewall - MAC Filtering

| Item | Description |
|---|---|
| ***Enable MAC Filtering*** | Click to enable the MAC filtering security function. |
| ***MAC Address*** ***Comments*** | To restrict data transmission from local network on certain MAC addresses, fill in the MAC address and your comments on it. ***Comments*** let you know about whys to restrict data from the MAC address. |
| ***Apply Changes*** | Click the ***Apply Changes*** button to register the MAC address to MAC filtering list. |
| ***Reset*** | Click the ***Reset*** button to abort change and recover the previous configuration setting. |
| ***Delete Selected*** | Click to delete the selected MAC address that will be removed from the MAC-filtering list. |
| ***Delete All*** | Click to delete all the registered entries from the MAC-filtering list. |
| ***Reset*** | Click the ***Reset*** button to abort change and recover the previous configuration setting. |

### 3.3.11 Firewall - Port Forwarding

Entries in this table allow you to automatically redirect common network services

to a specific machine behind the NAT firewall. These settings are only necessary if you wish to host some sort of server like a web server or mail server on the private local network behind your Gateway's NAT firewall.



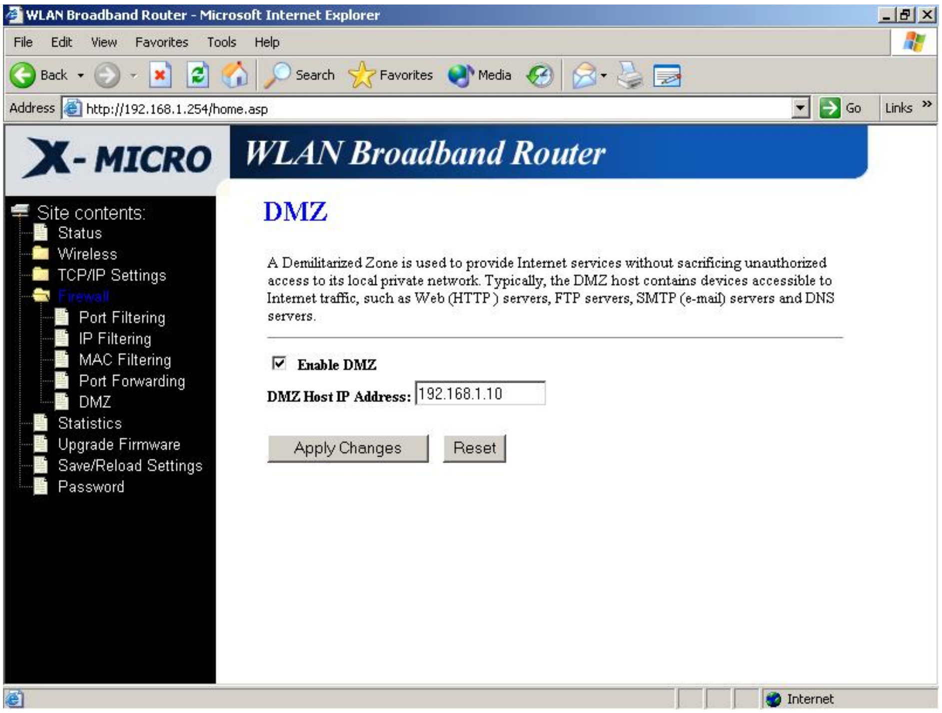

Screenshot – Firewall - Port Forwarding

| Item | Description |
|---|---|
| ***Enable Port Forwarding*** | Click to enable the Port Forwarding security function. |
| ***IP Address***<br>***Protocol***<br>***Port Range***<br>***Comment*** | To forward data packets coming from WAN to a specific IP address that hosted in local network behind the NAT firewall, fill in the IP address, protocol, port range and your comments.<br>The ***Protocol*** can be TCP, UDP or Both.<br>The ***Port Range*** for data transmission.<br>***Comments*** let you know about whys to allow data packets forward to the IP address and port number. |
| ***Apply Changes*** | Click the ***Apply Changes*** button to register the IP address and port number to Port forwarding list. |
| ***Reset*** | Click the ***Reset*** button to abort change and recover the previous configuration setting. |

| | |
|---|---|
| ***Delete Selected*** | Click to delete the selected IP address and port number that will be removed from the port-forwarding list. |
| ***Delete All*** | Click to delete all the registered entries from the port-forwarding list. |
| ***Reset*** | Click the ***Reset*** button to abort change and recover the previous configuration setting. |

### 3.3.12 Firewall - DMZ

A Demilitarized Zone is used to provide Internet services without sacrificing unauthorized access to its local private network. Typically, the DMZ host contains devices accessible to Internet traffic, such as Web (HTTP) servers, FTP servers, SMTP (e-mail) servers and DNS servers.



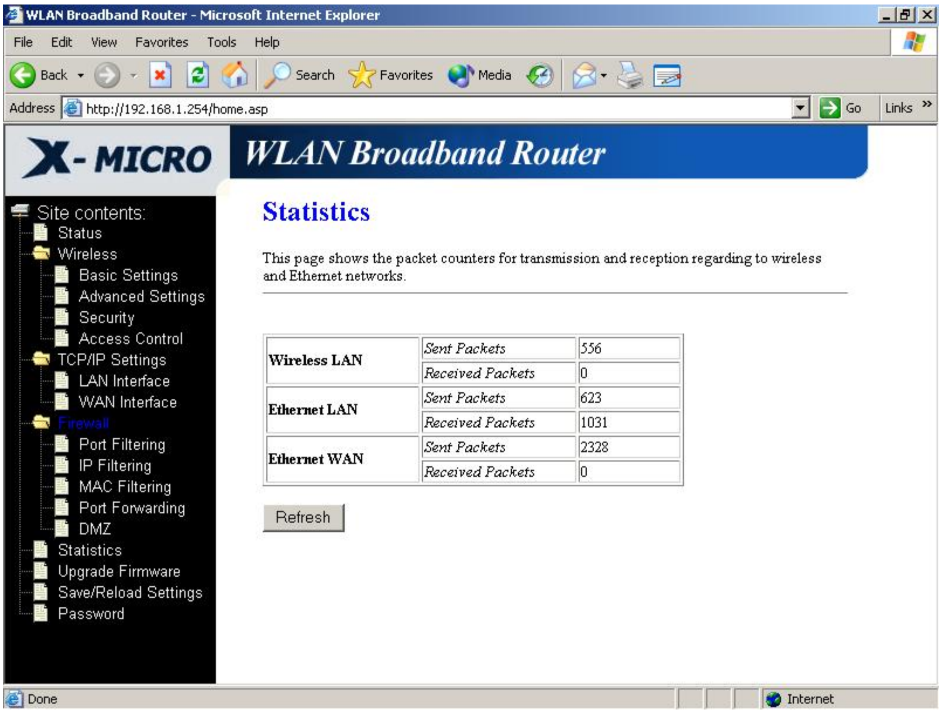

Screenshot – Firewall - DMZ

| Item | Description |
|---|---|
| ***Enable DMZ*** | Click to enable the DMZ function. |
| ***DMZ Host IP Address*** | To support DMZ in your firewall design, fill in the IP address of DMZ host that can be access from the WAN interface. |
| ***Apply Changes*** | Click the ***Apply Changes*** button to register the IP |

| | |
|---|---|
| | address of DMZ host. |
| ***Reset*** | Click the ***Reset*** button to abort change and recover the previous configuration setting. |

### 3.3.13 Statistics

This page shows the packet counters for transmission and reception regarding to wireless, Ethernet LAN and Ethernet WAN networks.



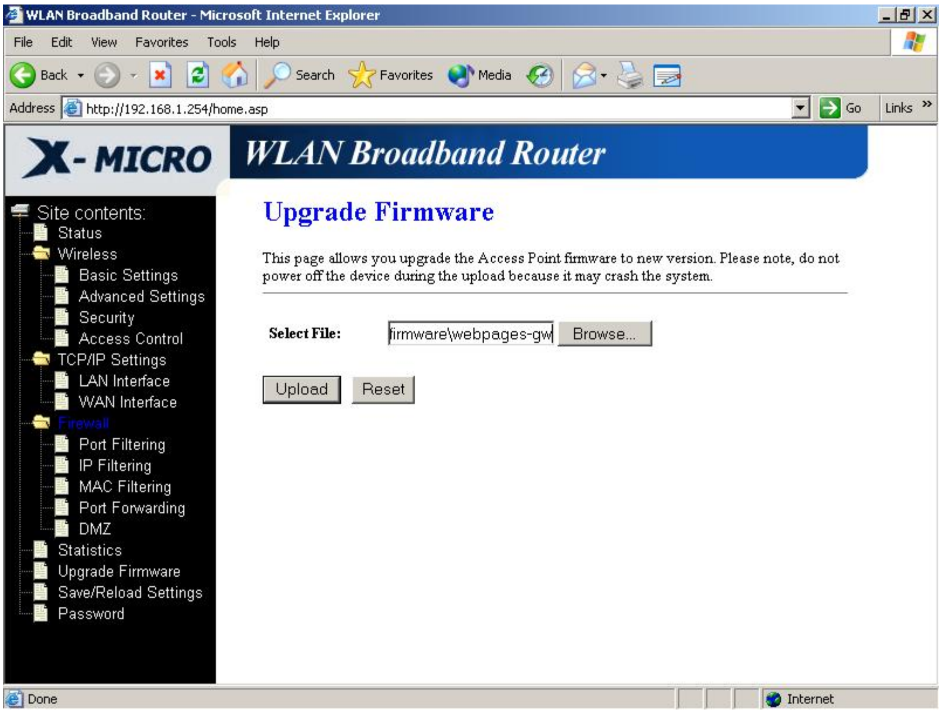

Screenshot – Statistics

| **Item** | **Description** |
|---|---|
| ***Wireless LAN Sent Packets*** | It shows the statistic count of sent packets on the wireless LAN interface. |
| ***Wireless LAN Received Packets*** | It shows the statistic count of received packets on the wireless LAN interface. |
| ***Ethernet LAN Sent Packets*** | It shows the statistic count of sent packets on the Ethernet LAN interface. |
| ***Ethernet LAN Received Packets*** | It shows the statistic count of received packets on the Ethernet LAN interface. |
| ***Ethernet WAN Sent Packets*** | It shows the statistic count of sent packets on the Ethernet WAN interface. |

| | |
|---|---|
| ***Ethernet WAN Received Packets*** | It shows the statistic count of received packets on the Ethernet WAN interface. |
| ***Refresh*** | Click the refresh the statistic counters on the screen. |

### 3.3.14 Upgrade Firmware

This page allows you upgrade the Access Point firmware to new version. Please note, do not power off the device during the upload because it may crash the system.



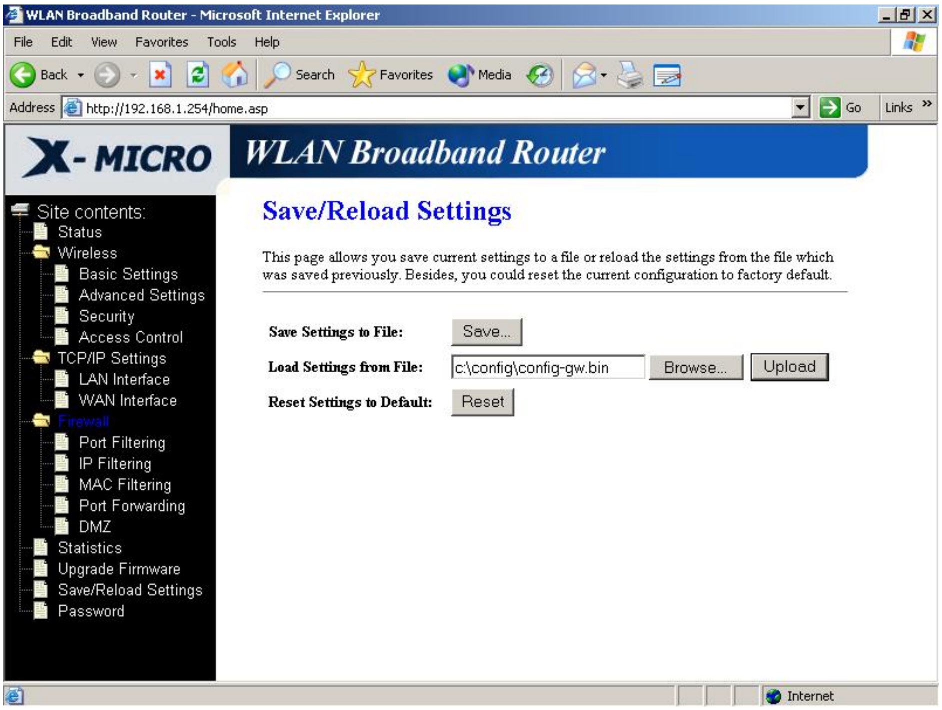

<u>Screenshot – Upgrade Firmware</u>

| Item | Description |
|---|---|
| ***Select File*** | Click the ***Browse*** button to select the new version of web firmware image file. |
| ***Upload*** | Click the ***Upload*** button to update the selected web firmware image to the X-Micro WLAN 11b Broadband Router. |
| ***Reset*** | Click the ***Reset*** button to abort change and recover the previous configuration setting. |

### 3.3.15 Save/ Reload Settings

This page allows you save current settings to a file or reload the settings from the

file that was saved previously. Besides, you could reset the current configuration to factory default.

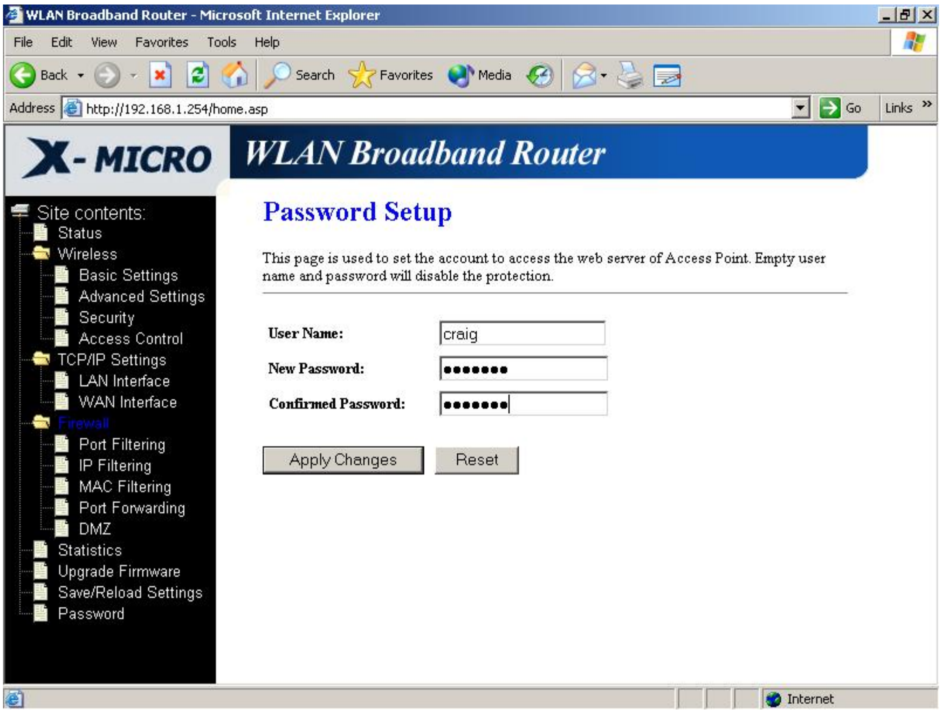



Screenshot – Save/Reload Settings

| Item | Description |
|---|---|
| ***Save Settings to File*** | Click the ***Save*** button to download the configuration parameters to your personal computer. |
| ***Load Settings from File*** | Click the ***Browse*** button to select the configuration files then click the ***Upload*** button to update the selected configuration to the X-Micro WLAN 11b Broadband Router. |
| ***Reset Settings to Default*** | Click the ***Reset*** button to reset the configuration parameter to factory defaults. |

### 3.3.16 Password Setup

This page is used to set the account to access the web server of Access Point. Empty user name and password will disable the protection.




Screenshot – Password Setup

| Item | Description |
|---|---|
| ***User Name*** | Fill in the user name for web management login control. |
| ***New Password*** | Fill in the password for web management login control. |
| ***Confirmed Password*** | Because the password input is invisible, so please fill in the password again for confirmation purpose. |
| ***Apply Changes*** | Clear the ***User Name*** and ***Password*** fields to empty, means to apply no web management login control.<br>Click the ***Apply Changes*** button to complete the new configuration setting. |
| ***Reset*** | Click the ***Reset*** button to abort change and recover the previous configuration setting. |

# 4 Frequently Asked Questions (FAQ)

## 4.1 What and how to find my PC's IP and MAC address?

IP address is the identifier for a computer or device on a TCP/IP network. Networks using the TCP/IP protocol route messages based on the IP address of the destination. The format of an IP address is a 32-bit numeric address written as four numbers separated by periods. Each number can be zero to 255. For example, 191.168.1.254 could be an IP address.

The MAC (Media Access Control) address is your computer's unique hardware number. (On an Ethernet LAN, it's the same as your Ethernet address.) When you're connected to the Internet from your computer (or host as the Internet protocol thinks of it), a correspondence table relates your IP address to your computer's physical (MAC) address on the LAN.

To find your PC's IP and MAC address,

- ✓ Open the Command program in the Microsoft Windows.
- ✓ Type in ***ipconfig /all*** then press the ***Enter*** button.

- ➢ Your PC's IP address is the one entitled IP Address and your PC's MAC address is the one entitled Physical Address.

## 4.2 What is Wireless LAN?

A wireless LAN (WLAN) is a network that allows access to Internet without the need for any wired connections to the user's machine.

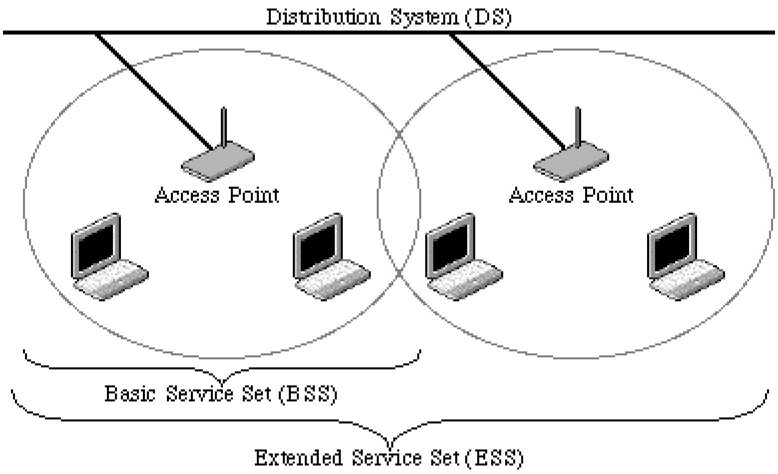
## 4.3 What are ISM bands?

ISM stands for Industrial, Scientific and Medical; radio frequency bands that the Federal Communications Commission (FCC) authorized for wireless LANs. The ISM bands are located at 915 +/- 13 MHz, 2450 +/- 50 MHz and 5800 +/- 75 MHz.

## 4.4 How does wireless networking work?

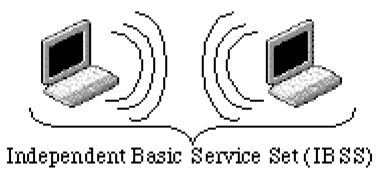
The 802.11 standard define two modes: infrastructure mode and ad hoc mode. In infrastructure mode, the wireless network consists of at least one access point connected to the wired network infrastructure and a set of wireless end stations. This configuration is called a Basic Service Set (BSS). An Extended Service Set (ESS) is a set of two or more BSSs forming a single subnetwork. Since most corporate WLANs require access

to the wired LAN for services (file servers, printers, Internet links) they will operate in infrastructure mode.




Example 1: wireless Infrastructure Mode

Ad hoc mode (also called peer-to-peer mode or an Independent Basic Service Set, or IBSS) is simply a set of 802.11 wireless stations that communicate directly with one another without using an access point or any connection to a wired network. This mode is useful for quickly and easily setting up a wireless network anywhere that a wireless infrastructure does not exist or is not required for services, such as a hotel room, convention center, or airport, or where access to the wired network is barred (such as for consultants at a client site).




Example 2: wireless Ad Hoc Mode

## 4.5 What is BSSID?

A six-byte address that distinguishes a particular a particular access point from others. Also know as just SSID. Serves as a network ID or name.

## 4.6 What is ESSID?

The Extended Service Set ID (ESSID) is the name of the network you want to access. It is used to identify different wireless networks.

## 4.7 What are potential factors that may causes interference?

Factors of interference:

- ➢ Obstacles: walls, ceilings, furniture… etc.
- ➢ Building Materials: metal door, aluminum studs.
- ➢ Electrical devices: microwaves, monitors and electrical motors.

Solutions to overcome the interferences:

- ✓ Minimizing the number of walls and ceilings.
- ✓ Position the WLAN antenna for best reception.
- ✓ Keep WLAN devices away from other electrical devices, eg: microwaves, monitors, electric motors, … etc.
- ✓ Add additional WLAN Access Points if necessary.

## 4.8 What are the Open System and Shared Key authentications?

IEEE 802.11 supports two subtypes of network authentication services: open system and shared key. Under open system authentication, any wireless station can request authentication. The station that needs to authenticate with another wireless station sends an authentication management frame that contains the identity of the sending station. The receiving station then returns a frame that indicates whether it recognizes the sending station. Under shared key authentication, each wireless station is assumed to have received a secret shared key over a secure channel that is independent from the 802.11 wireless network communications channel.

## 4.9 What is WEP?

An optional IEEE 802.11 function that offers frame transmission privacy similar to a wired network. The Wired Equivalent Privacy generates secret shared encryption keys that both source and destination stations can use to alert frame bits to avoid disclosure to eavesdroppers.

WEP relies on a secret key that is shared between a mobile station (e.g. a laptop with a wireless Ethernet card) and an access point (i.e. a base station). The secret key is used to encrypt packets before they are transmitted, and an integrity check is used to ensure that packets are not modified in transit.

## 4.10 What is Fragment Threshold?

The proposed protocol uses the frame fragmentation mechanism defined in IEEE 802.11 to achieve parallel transmissions. A large data frame is fragmented into several

fragments each of size equal to fragment threshold. By tuning the fragment threshold value, we can get varying fragment sizes. The determination of an efficient fragment threshold is an important issue in this scheme. If the fragment threshold is small, the overlap part of the master and parallel transmissions is large. This means the spatial reuse ratio of parallel transmissions is high. In contrast, with a large fragment threshold, the overlap is small and the spatial reuse ratio is low. However high fragment threshold leads to low fragment overhead. Hence there is a trade-off between spatial re-use and fragment overhead.

Fragment threshold is the maximum packet size used for fragmentation. Packets larger than the size programmed in this field will be fragmented.

If you find that your corrupted packets or asymmetric packet reception (all send packets, for example). You may want to try lowering your fragmentation threshold. This will cause packets to be broken into smaller fragments. These small fragments, if corrupted, can be resent faster than a larger fragment. Fragmentation increases overhead, so you'll want to keep this value as close to the maximum value as possible.

## 4.11 What is RTS (Request To Send) Threshold?

The RTS threshold is the packet size at which packet transmission is governed by the RTS/CTS transaction. The IEEE 802.11-1997 standard allows for short packets to be transmitted without RTS/CTS transactions. Each station can have a different RTS threshold. RTS/CTS is used when the data packet size exceeds the defined RTS threshold. With the CSMA/CA transmission mechanism, the transmitting station sends out an RTS packet to the receiving station, and waits for the receiving station to send back a CTS (Clear to Send) packet before sending the actual packet data.

This setting is useful for networks with many clients. With many clients, and a high network load, there will be many more collisions. By lowering the RTS threshold, there may be fewer collisions, and performance should improve. Basically, with a faster RTS threshold, the system can recover from problems faster. RTS packets consume valuable bandwidth, however, so setting this value too low will limit performance.

## 4.12 What is Beacon Interval?

In addition to data frames that carry information from higher layers, 802.11 includes management and control frames that support data transfer. The beacon frame, which is a type of management frame, provides the "heartbeat" of a wireless LAN, enabling

stations to establish and maintain communications in an orderly fashion.

Beacon Interval represents the amount of time between beacon transmissions. Before a station enters power save mode, the station needs the beacon interval to know when to wake up to receive the beacon (and learn whether there are buffered frames at the access point).

## 4.13 What is Preamble Type?

There are two preamble types defined in IEEE 802.11 specification. A long preamble basically gives the decoder more time to process the preamble. All 802.11 devices support a long preamble. The short preamble is designed to improve efficiency (for example, for VoIP systems). The difference between the two is in the Synchronization field. The long preamble is 128 bits, and the short is 56 bits.

## 4.14 What is SSID Broadcast?

Broadcast of SSID is done in access points by the beacon. This announces your access point (including various bits of information about it) to the wireless world around it. By disabling that feature, the SSID configured in the client must match the SSID of the access point.

Some wireless devices don't work properly if SSID isn't broadcast (for example the D-link DWL-120 USB 802.11b adapter). Generally if your client hardware supports operation with SSID disabled, it's not a bad idea to run that way to enhance network security. However it's no replacement for WEP, MAC filtering or other protections.

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